NOS Workshop
Ames Research Center Pilot Project:
'Tip' and 'Cue' Architectures for The New Observing System

February 2020

Motivation: Oroville Dam

i.e. Why you want an accurate Quantitative Precipitation Estimates (QPEs)

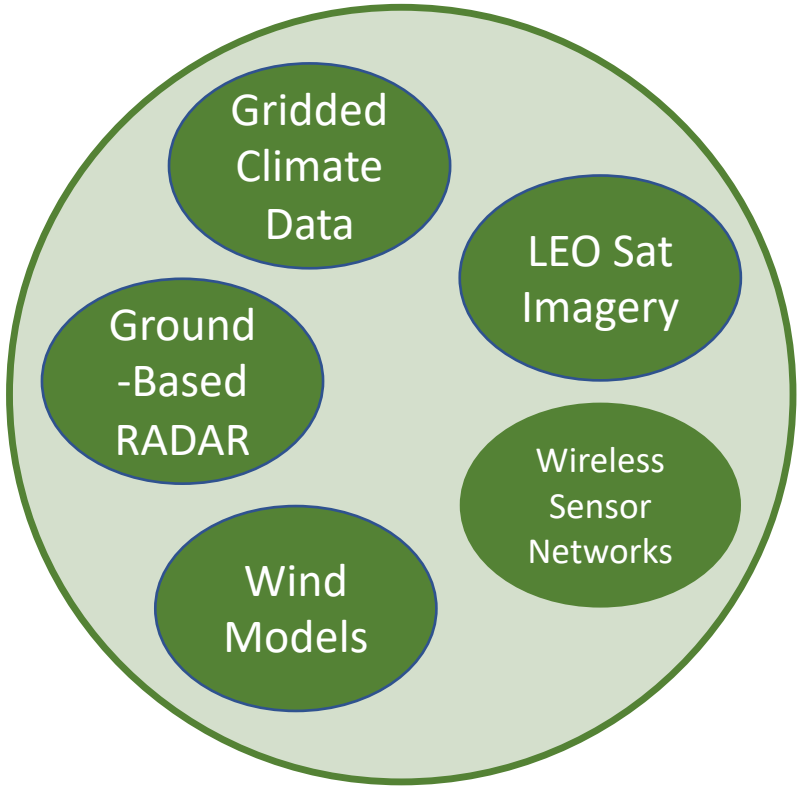
Dam operators were required to discharge water based on charts contained in the *Oroville Dam Reservoir Regulation Manual (1970)*

Accurate, timely estimates -> better discharge predictions -> avoiding catastrophes

Static vs. Dynamic Resources

Static Resources

- Fixed scope
- Fixed Resources
- Cost amortized over many users
- Low Data Volumes over a large area



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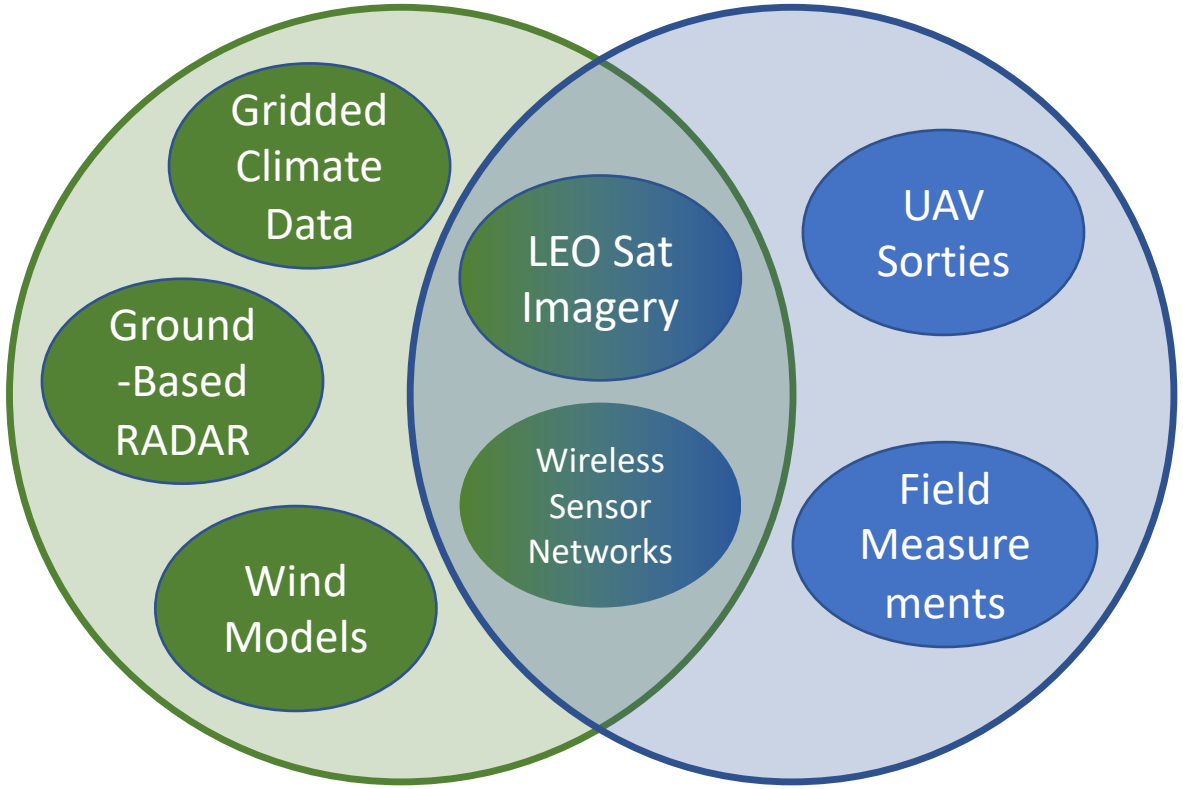

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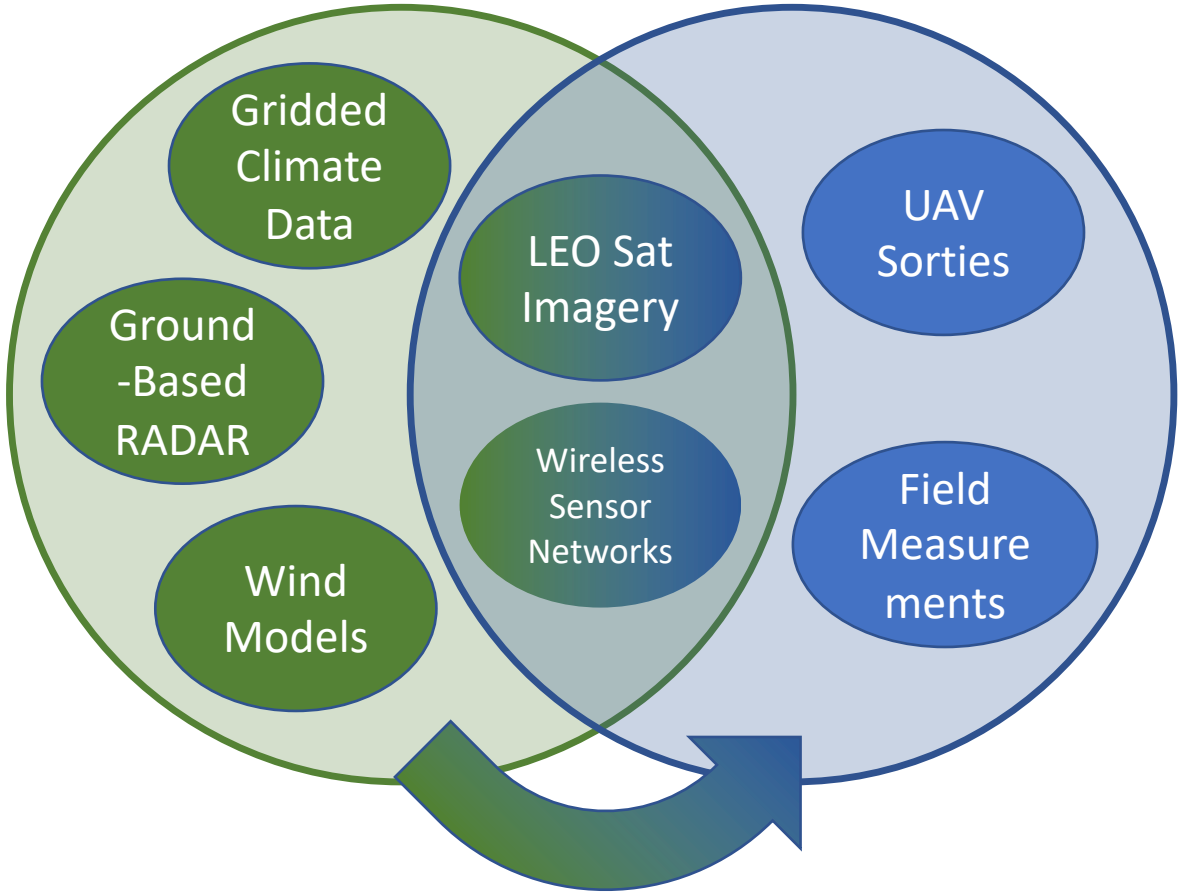

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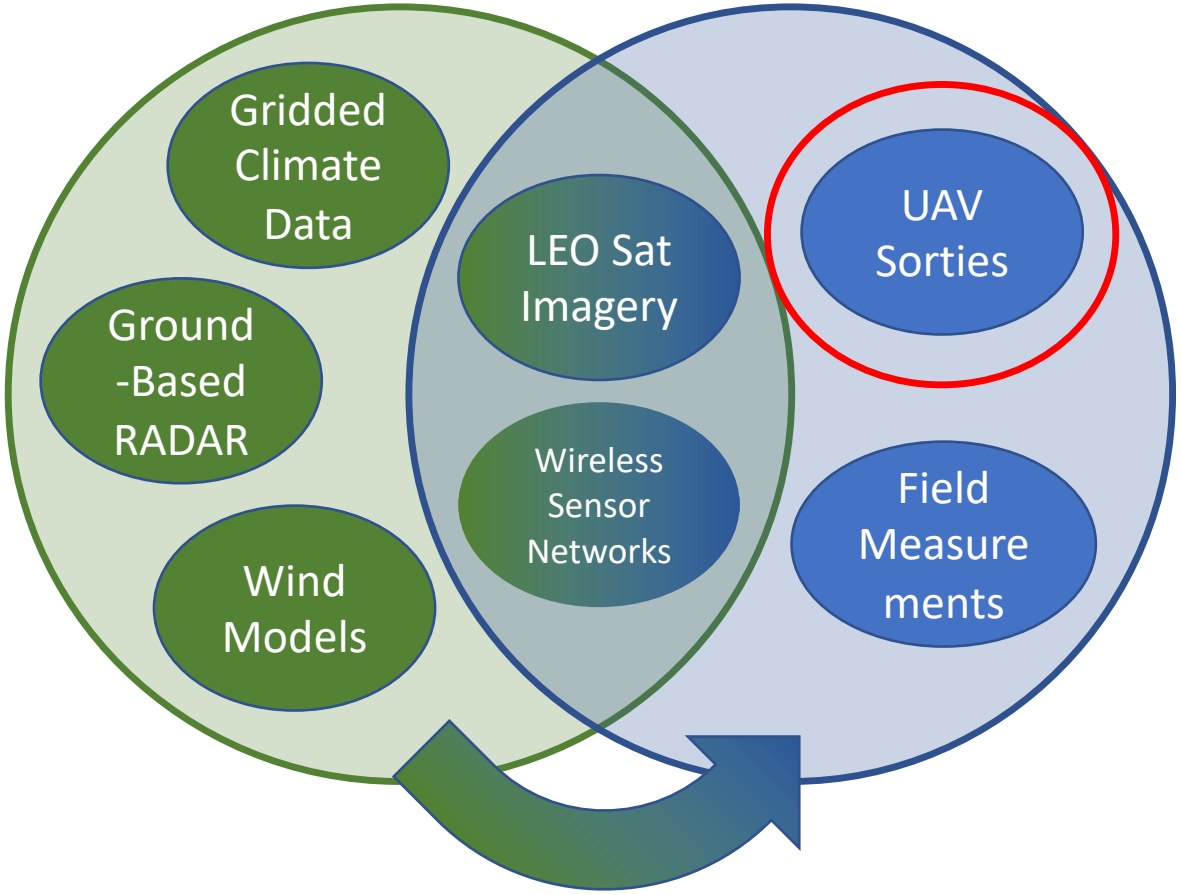
Static Data Sources Identify Events (tip) and Deploy (cue) **Dynamic Data Sources** with Targeted Observation Campaigns

Static vs. Dynamic Resources



The USGS NextGen Water Observing System (NGWOS) will integrate “improved bidirectional comms for sensors nodes” and “integrated mobile monitoring assets”

Mapping river water depth by using a drone-mounted ground-penetrating radar system (white equipment). (Credit: John W. Lane, USGS)

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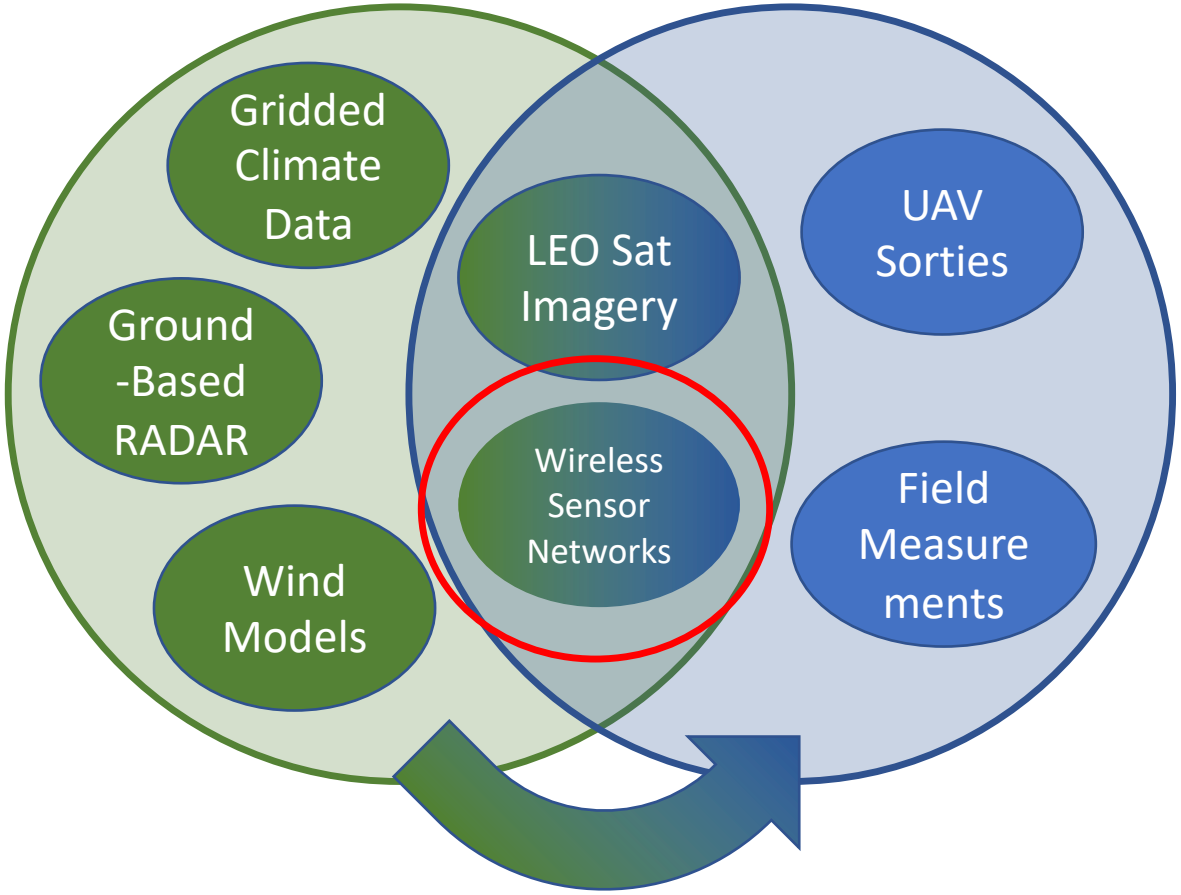

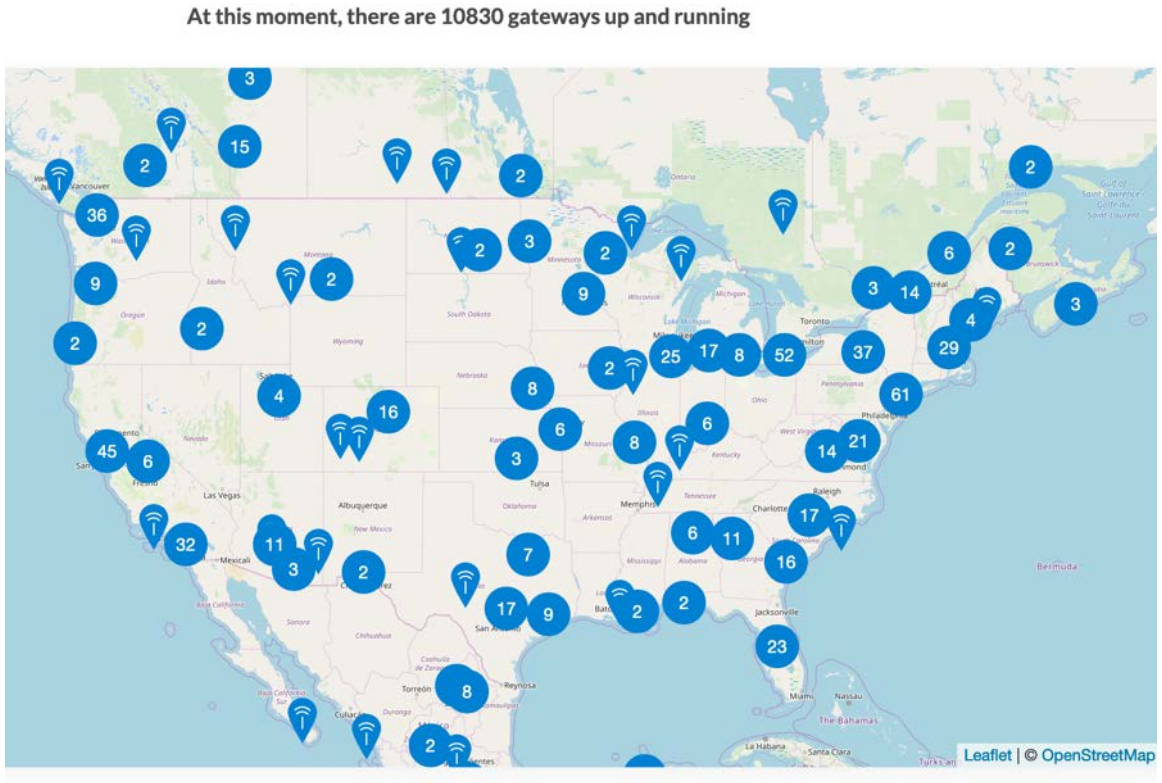

Massive private/crowdsourced buildout of shared RF infrastructure called the **Internet of Things**

Open Questions in Research

Question:

How can we have enough advance warning to prepare/deploy dynamic observations?

When is an impending event going to occur?

Technologies

Interfaces to/from forecast tools & ”global data sources” (e.g. SSMIS IWV data products)

How can we best supplement existing static resources to provide the most accurate estimates?

Where do the assets go?

Rapid prototyping tools for testing new state estimation and tasking algorithms

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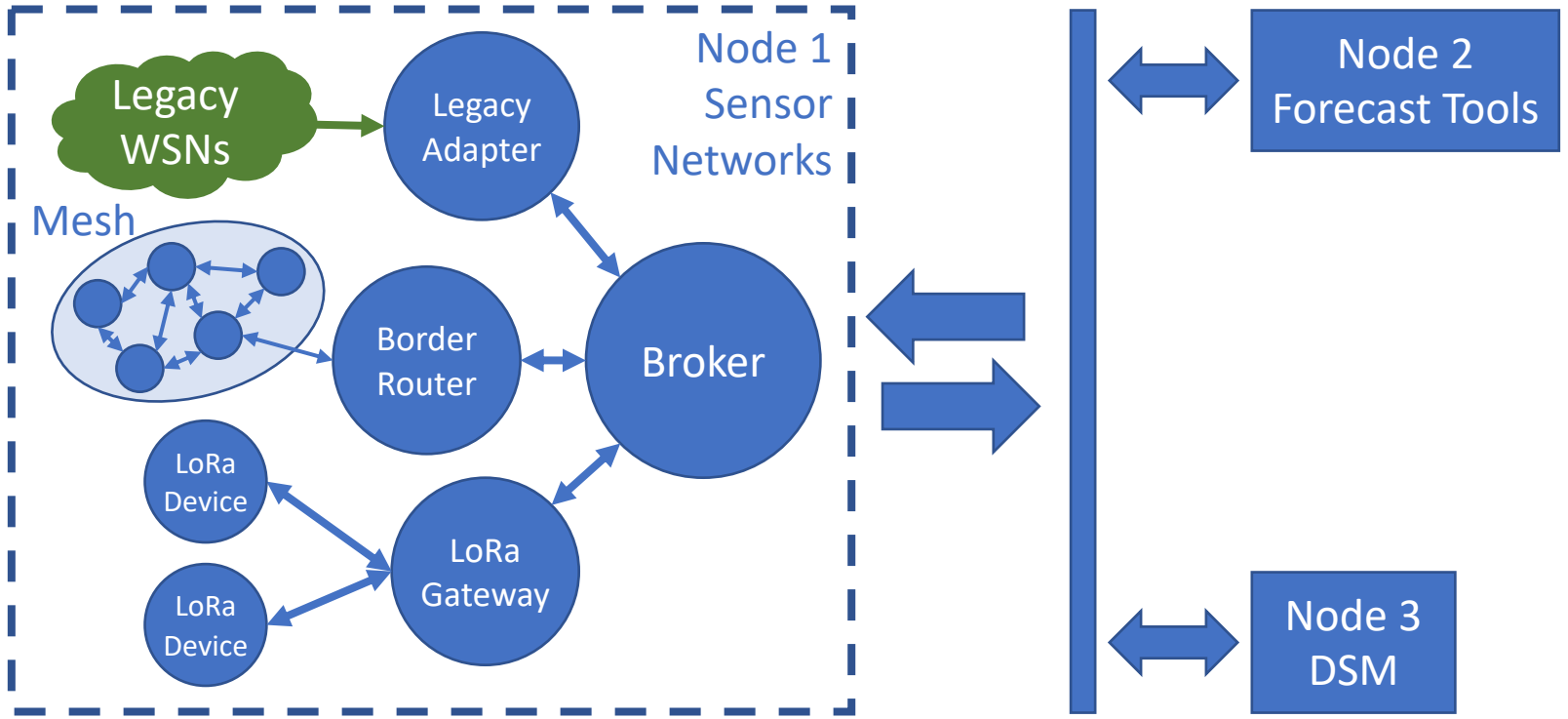
Model-driven Measurement Acquisition

A broker provides the primary tasking interface between sensor networks with varying network topologies and capabilities, and other nodes in NOS-T

Implements standards/ontologies in order to provide sensor networks as a service



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AIST & ESIP
New Observing Strategies (NOS)

Event-Driven Measurement Acquisition

ESTO
Earth Science Technology Office

Date Range

Data Type (e.g. IWV)

SSMIS
NOAA PSD

URL

PNG

Satellite Imagery

NCDC
CDO

URL

JSON

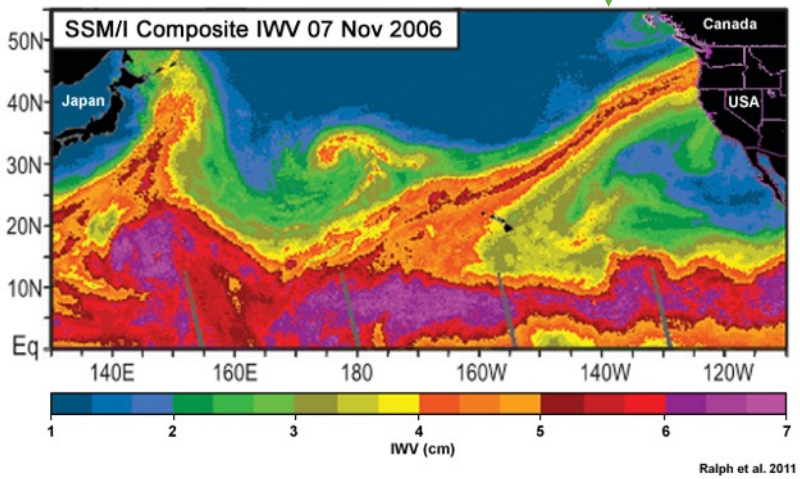
Legacy Adapter

Broker

Custom Fusion Algorithm

Expected Outputs (River Discharge, gridded climate data)

Data Display



Feature ID Algorithm

AR Landfall Location

Date Range
Lat/Lon Box
Sensor Data Type

Open Questions

- What is the most effective way to integrate new techniques and data sources in a way that enables rapid prototyping?
- What kinds of time-sensitive, objective-oriented retasking can bring real science value to stakeholders?

Thank you!